Advanced Weather Radar Techniques Product Development Team

National Center for Atmospheric Research

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Task 04.6.2.4 Winter storm cases

Datasets collected during the 2002-2003 and 2003-2004 winters have been archived and preliminary analyses performed. Activities have concentrated on the microphysical properties of winter storms. A summary of important results is given in the attached report entitled "Microphysical properties of Colorado Winter Storms Deduced from Video Disdrometer Observations".

Task 04.6.2.9 Collection of winter storms datasets

NCAR's S-band dual-polarization radar operated during the WISP04 field program. In addition, dual-wavelength radar measurements, video disdrometer observations, and in situ aircraft measurements were obtained. The attached report "Winter Storm Studies: Comparison of Observations form a 2-D Video Disdrometer and a Polarimetric Radar" describes some of these activities. A methodology was developed for obtaining snow density. This activity also supports efforts related to rain-snow discrimination with polarimetric radar (Task 04.6.2.4).

Task 04.6.2.10 Examination of icing events during IMPROVE field programs

Preliminary investigation of the available datasets revealed that aircraft activities and polarimetric radar data collections were uncoordinated. Consequently, polarimetric radar measurements are not available for significant icing events. Future efforts will focus on the WISP04 dataset and possibly datasets collected in conjunction with the AIRS2 field program. The need for definitive datasets is likely to continue however.

Task 04.6.2.11 Analysis of winter storm microphysics

The analysis of winter storm microphysics and basic studies to discriminate hydrometeor types, quantify winter precipitation, and "predict" visibility are summarized in the attached reports. These studies indicate that radar can detect subtle changes in particle habits and that it should be possible to estimate the governing parameters of hydrometeor distributions. Efforts conducted under tasks 04.6.2.4 and 04.6.2.11 were described in a poster presented at the 11th Conference on Aviation, Range and Aerospace Meteorology.

Task 04.6.2.11 NCAR hail detection algorithm

An examination of proposed hail detection algorithms was conducted. This activity is described in the attached report "Hail detection with polarimetric radar: A review". This report concludes that there are important advantages with polarimetric radar for

specifying the location of hail and perhaps its size. Tested algorithms were applied to storms observed in Oklahoma and Florida. A summary was presented at the 11th Conference on Aviation, Range and Aerospace Meteorology. Potential problems are likely for smaller hail in storms with unusually large or small drops. The consistency method for hail detection is being added to the suite of algorithms available on NCAR's S-Pol radar. Datasets collected during RAPS92 and RAPS93 field programs are to be transferred to NSSL for evaluation. This ends our effort on hail detection.

Task 04.6.2.13 Activities related to NCAR's freezing level algorithm

Testing of the algorithm on a WSR-88D dataset was completed last year and described in final report. A description of the algorithm (Freezing level estimation with polarimetric radar) was accepted for publication in the Journal of Applied Meteorology.   Application to a winter storm with two freezing levels is described in a paper (Polarimetric radar observation of multiple freezing levels) to be published in the Journal of Atmospheric Sciences. The freezing level algorithm was also described in a paper presented at the 31st Conference on Radar Meteorology. This activity has ended.